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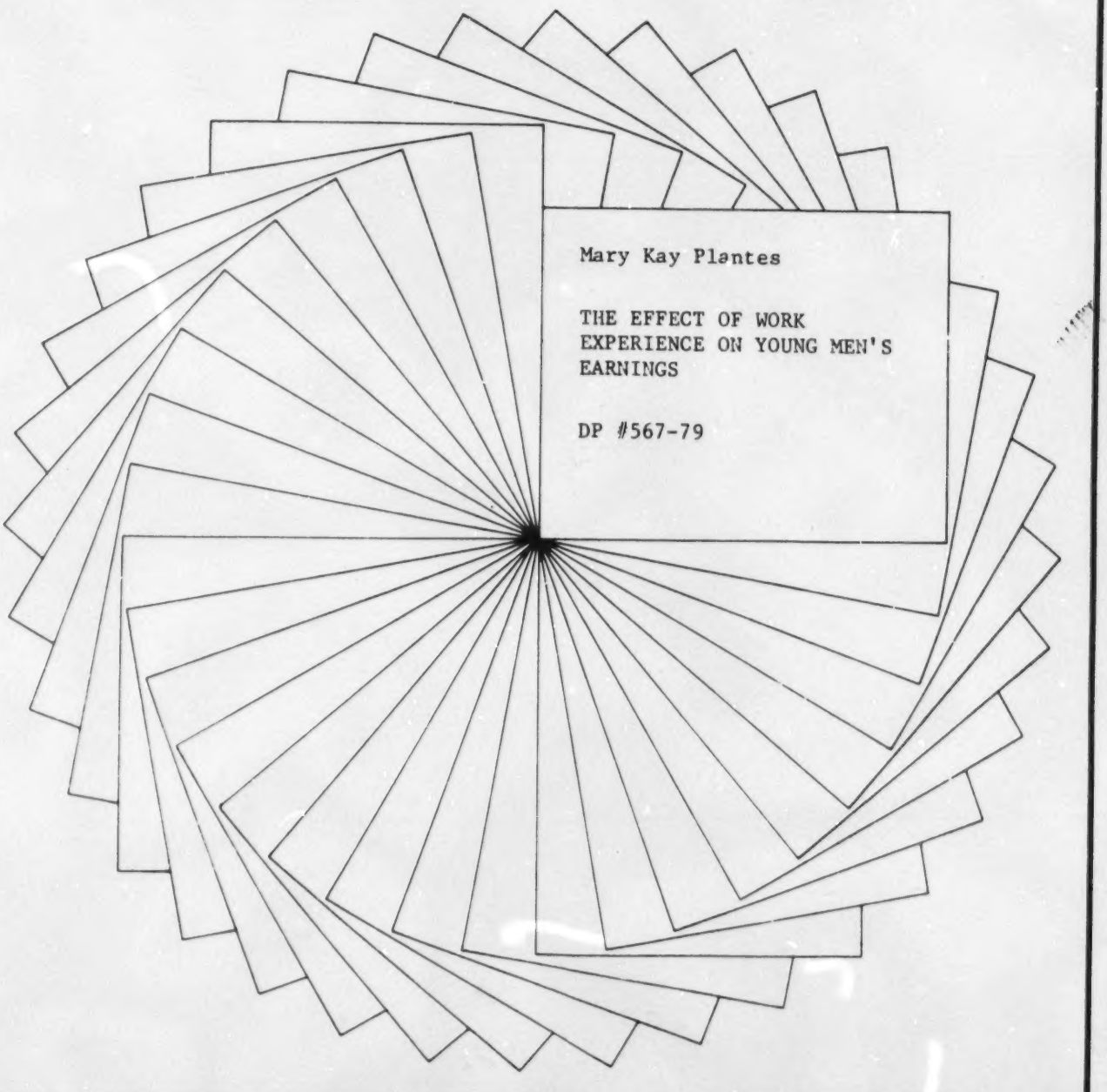

Mary Kay Plantes

THE EFFECT OF WORK EXPERIENCE ON YOUNG MEN'S EARNINGS

DP #567-79

The Effect of Work Experience on Young Men's Earnings

Mary Kay Plantes
University of Wisconsin-Madison

September 1979

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ABSTRACT

Most empirical analyses of earnings measure work experience as years since school graduation and cannot, therefore, separate age and experience effects. This study demonstrates that the return to work experience is highly significant in the presence of age variables, but that the returns to experience and schooling are sensitive to the way experience is measured. Initial employment experiences are shown to have a significant effect on subsequent earnings; failure to account for this in an experience measure attributes too much human capital development to nonwork activities and reduces our ability to explain the earnings of young men aged 16-32.

Recent research exploring the means by which work experience affects earnings has raised a number of challenging questions about the nature of the link between the two. (See Medoff and Abraham's (1978) research challenging the link between work experience and productivity and Hanushek and Quigley's research (1978a, b) on the returns to human capital investments.) This paper further pursues the link among measures of experience, schooling, and earnings and shows that both the experience-earnings and school-earnings relationships are extremely sensitive to the way experience is measured. It also demonstrates that early experiences in the labor market have significant effects on concurrent and subsequent earnings of men aged 16 to 32.

Section 1 discusses sources and implications of econometric bias accompanying conventional proxies for work experience. In Section 2, the data used to test the relationship between experience and earnings are discussed. Section 3 presents a set of experience-log real earnings profiles using different measures of experience but sampling the same people. Finally, Section 4 provides evidence of the bias accompanying conventional experience measurements.

1. CONVENTIONAL PROXIES FOR MEASURING WORK EXPERIENCE

The scarcity of data measuring both work experience and earnings has resulted in the use of a proxy for measuring work experience in the estimation of earnings functions. The proxy is an identity based on schooling and age:

$$EXP_t = \underline{a}_t - \underline{s} - 5 \qquad (1)$$

where EXP_t is years of accumulated experience, a_t is age (in years), and s is years of completed schooling, all evaluated at the start of period t.[1]

Sources and Implications of Bias

Three major biases are associated with using equation (1) as an experience proxy. First, experience is forced to play a double role in the earnings function; it measures the effect of work experience and it proxies for the age variable, necessarily omitted due to the linear dependency among schooling, experience, and age when experience is not measured directly. This confounding of age and experience effects on earnings will understate the contribution of work experience if, as expected, earnings growth is attributable more to experience than to aging.

Second, the experience variable is measured with error, which arises because the experience proxy treats all individuals in all schooling and age groups as accumulating identical experience each year. An additional source of measurement error for some persons is the experience proxy's exclusion of pregraduation work experience. Measurement error will, in general, bias the effect of work experience in the earnings function towards zero and, to the extent that schooling and unmeasured work experience are positively correlated, bias the effect of schooling in the earnings function upwards.

While both of the aforementioned sources of bias have been referred to in the literature (e.g., Griliches, 1973), lack of data has, for the most part, precluded their quantitative evaluation. Quigley and Klevmarken (1976), a notable exception, show that within a group of Swedish engineers with college degrees, age at first postschooling job proxies for

pregraduation work experience, and its omission biases the experience coefficient downwards. Hauser (1979) finds similar patterns for a sample of Wisconsin men. The study presented here uses a new data base which (a) provides estimates of the separate effects of age and experience on earnings and (b) reduces measurement error in the experience variable by differentiating the individual's experience accumulation during a year.

A third source of bias is that experience proxy (1) is a potentially inadequate measure of work related activities that enhance human capital. A correct measurement of work experience requires that we identify, first, relevant activities and then ways to measure the frequency of their occurrence. Data inadequacies typically result in work experience being defined as time spent in the labor force, time employed, or in the case of experience proxy (1), time since school graduation. Restricting experience in this manner has implications for the steepness of the estimated profile. Frequent job changing may, for example, promote rapid earnings growth; if so, the concavity of the experience profile may not reflect a declining return to experience as individuals gain experience but, rather, fewer job changes as individuals age. Corcoran and Duncan (1979) have provided estimates of the contribution of different experience-gaining activities to earnings growth.

Even when experience is defined broadly, as time employed or in the labor force, that definition requires a further refinement: the starting date from which experience is to be accumulated, and the method by which experience accumulated within a period is to be measured must be chosen. The conventional choice is to accumulate years in the labor force since school graduation; this is implicit in equation (1) and explicit in many

studies using longitudinal data. The data used in this study permit alternative choices of starting date and accumulation measures for general experience; thus, they allow empirical quantification of the sensitivity of earnings function parameters to the way experience is measured.

2. CONTINUOUS WORK HISTORY SAMPLE DATA

The Continuous Work History Sample (CWHS) of the Social Security Administration is a fruitful data base for evaluating the effect of work experience on earnings. By using the CWHS, it is possible to create individual work experience variables which (a) measure experience from an early age and (b) differentiate the intensities of individuals' work experience during a year. These attributes alleviate some of the econometric biases which accompany conventional work experience measures.

In the CWHS experience is defined as total time employed in all covered employment and is, therefore, a measure of general as opposed to firm-specific work experience. The CWHS has the advantage that the analyst can choose the starting date and the method for evaluating how much experience is accumulated each period. This flexibility is just what is required to test the sensitivity of the experience-earnings relationship to these components of an experience definition.

Six measures of general work experience were selected to examine the parameters of the experience-log real earnings profile and to test their sensitivity to the measure used. The measures are the product of two criteria for experience accumulation and three criteria for establishing the point in the life cycle at which experience begins to be cumulative.

Experience accumulation. Two methods for measuring the accumulation of work experience are available in the CWHS. One is a YEARS criterion--the number of years with positive earnings. The other is a QUARTERS criterion--the number of quarters worked in a given year, summed over all the years worked and then adjusted to a yearly basis. A quarter of work experience is one in which wages and salaries are greater than $50.[1]

Thus, for example, an individual who works four quarters a year for T years will have T years of accumulated experience at the start of year T+1 under both the YEARS and QUARTERS measure, whereas an individual who works two quarters a year for T years will have T years of accumulated experience under the YEARS criterion and (2xT)/4 (rounded down) years of accumulated experience under the QUARTERS criterion.

Entry age. Alternative starting dates are based on the QUARTERS criterion for measuring work experience. Thus,

ENTRY 1 is defined as the first year of earnings in social security covered employed;

ENTRY 2 is defined as the first year in which two quarters of work experience are earned;

ENTRY 3 is defined as the first year in which four quarters of work experience are earned.

Each combination of starting date and experience accumulation criteria produces a separate sample for which the experience-log real earnings relationship can be estimated, and offers an alternative to experience proxy (1). Measurement error considerations argue for the QUARTERS criterion being empirically superior to the YEARS criterion, since the former provides more differentiation of individuals' experience accumulation. The correct choice for a starting date is that point in the life

cycle when work experience begins contributing significantly to human capital formation; empirical estimation in Section 4 seeks to identify this starting point.

3. EMPIRICAL ESTIMATION

Equation (2) is estimated on each of the six CWHS samples.

$$y^{r}_{exp,a,t} = f\ (\text{age, experience, race, secular trend}) + \varepsilon^{r}_{exp,a,t} \qquad (2)$$

$$t = 1957, \ldots, 1973^{2}$$

where

(a) $y^{r}_{exp,a,t}$ is the mean log real earnings of individuals in specific age, experience, and race categories in year t who have met the appropriate starting date criterion.[3]

(b) $\varepsilon^{r}_{exp,a,t}$ is the mean transitory income component, uncorrelated with $f(\ )$ and distributed normally with mean 0 and a diagonal variance-covariance matrix with elements $(\sigma^{2}/N^{r}_{exp,a,t})$ where $N^{r}_{exp,a,t}$ is the number of individuals in the aggregation unit.

(c) Race effects are measured by a dichotomous variable equal to 1 for blacks and zero for whites.

(d) Secular trends are measured by a linear time trend with 1957 = 1.

(e) Piecewise linear specifications were used in all estimations of the age-log real earnings and experience-log real earnings function (see Smith and Welch, 1977). The specifications contain four break points in each profile and provide an estimate of the standard error of the slope of the age-log real earnings and experience-log real earnings profiles over different age and

experience intervals. The constant term gives the expected value of earnings at age 16 for those who have just begun to accumulate work experience, after the effects of other variables are taken into account. Experience refers to work experience accumulated prior to the start of year t.

Lack of educational attainment data in the CWHS precludes estimation of equation (2) using the conventional experience proxy (1). Although a proxy for entry-level human capital is available by using the age at which the entry criterion is first met, this proxy is not comparable across samples and, therefore, is not used in the initial estimates.

Figure 1 plots and Table 1 provides the relevant statistics of the six estimated experience-log real earnings profiles where distinct samples are referred to by their starting date (1, 2, 3) and experience measure (Q for QUARTERS and Y for YEARS of experience). Differences in the estimates result from differences in both the criteria for accumulating work experience and the starting date for measuring experience accumulation. These are discussed in turn.

Given a starting date, experience profiles are steeper when work experience accumulation is measured by QUARTERS rather than YEARS. Also, experience is more significant with the QUARTERS rather than YEARS measure. The experience variables are highly significant with F-statistics ranging from 60 (4,1809) for the 3Y sample to 1,204 (4,1796) for the 1Q sample.[4] (Five percent and 1% critical values of the F-statistic $[4,\infty]$ are 2.79 and 3.32, respectively.) These findings are indicative of reduced measurement error in the experience variable when within-year differences in experience accumulation are accounted for in the experience measure.

Figure 1. Experience-Log Real Earnings

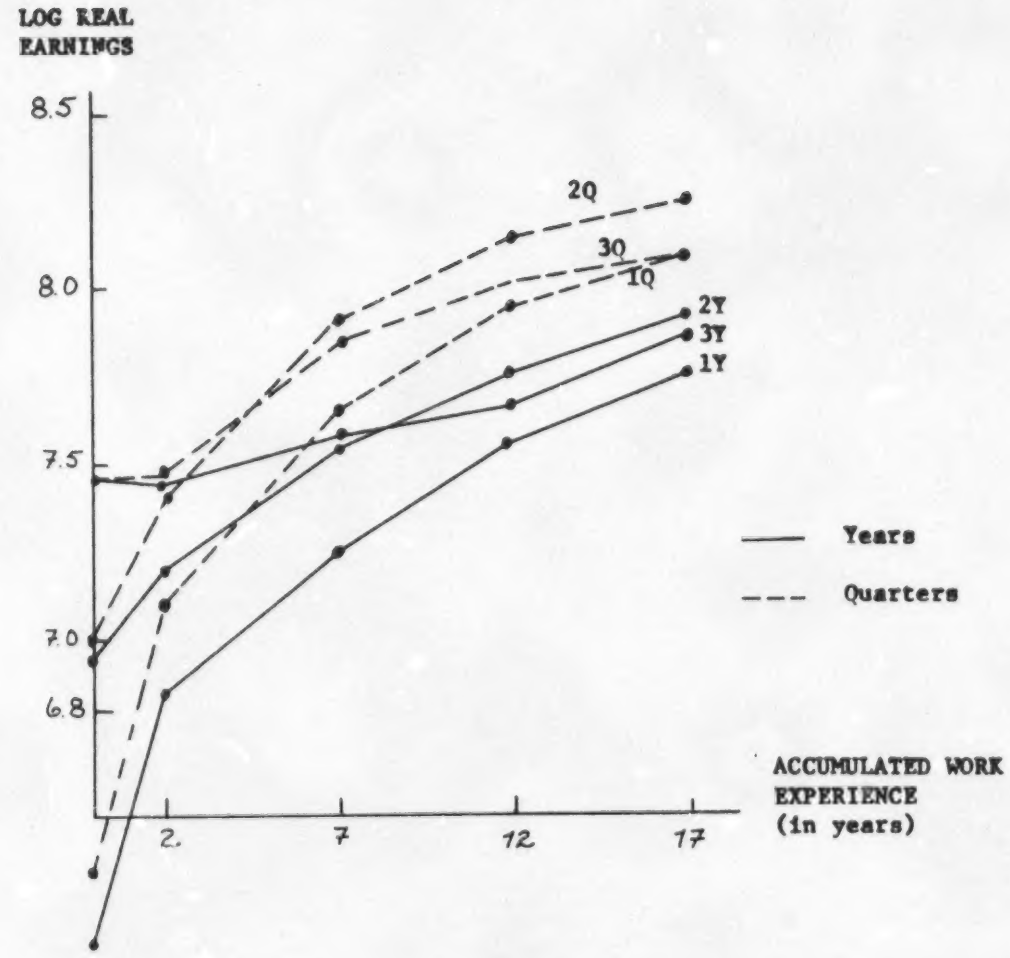

Table 1

Experience-Log Real Earnings
(Weighted least squares estimation; s.e. in parentheses)

Slope of the Experience-Log Real Earnings Profile over Accumulated Experience Range (in years)

Sample	0-2	2-7	7-12	12-17
1Y	.2429 (.0073)	.0763 (.0034)	.0583 (.0046)	.0459 (.0118)
2Y	.1204 (.0059)	.0724 (.0031)	.0377 (.0049)	.0341 (.0165)
3Y	-.0234 (.0059)	.0382 (.0030)	.0236 (.0052)	.0367 (.0252)
1Q	.3006 (.0062)	.1151 (.0036)	.0537 (.0065)	.0254 (.0339)
2Q	.1827 (.0055)	.1062 (.0031)	.0497 (.0028)	.0256 (.0306)
3Q	-.0104 (.0061)	.0819 (.0031)	.0421 (.0059)	.0117 (.0348)

Real Earnings Level at Break Points (1967 dollars)
(in natural logs)

	Accumulated Experience Level (in years)			
Sample	2	7	12	17
1Y	6.8486	7.2301	7.5216	7.7511
2Y	7.2009	7.5629	7.7514	7.9219
3Y	7.3847	7.5757	7.6937	7.8772
1Q	7.1106	7.6891	7.9576	8.0846
2Q	7.3474	7.8784	8.1269	8.2549
3Q	7.4028	7.8123	8.0228	8.0813

Y, Q = years and quarters of experience, respectively.

The changes in the earnings profiles in response to changes in starting dates result from the fact that work experience has a greater effect on earnings growth in the early stages of the life cycle. The earlier in the life cycle that experience is first tabulated, the steeper are experience profiles. The slope of the experience profile from entry to two years of accumulated work experience ranges from .3006 (Entry 1) to -.0104 (Entry 3) using a QUARTERS measure and .2429 (Entry 1) to -.0234 (Entry 3) using the YEARS measure. The negative slope of the experience profile over this interval in the 3Y and 3Q samples reflects greater variation in quarters worked during early experience intervals. How much of the variance is due to school, job search, and/or involuntary unemployment is not ascertainable. Earlier starting dates also result in higher t-statistics of the experience variables.

Table 2 and Figure 2 show that the method used to measure experience also affects the concavity of the age profile. Age profiles turn downward in each sample, but at earlier ages when a QUARTERS measure and earlier entry dates are used. The steeper age-log real earnings profiles accompanying the earlier starting dates result in faster earnings growth at early stages of the life cycle.

The relative contributions of age and experience in explaining young men's earnings variation and earnings growth depends upon how experience is measured. When the QUARTERS measure and Entry 1 or 2 are used, the experience variables explain more of the variation in earnings than do the age variables (see note 4). Table 3 compares the contributions of age and experience to earnings growth.[5] By age 28, experience accumulation has contributed more than aging to earnings growth in half of the

Table 2

Age-Log Real Earnings
(s.e. in parentheses)

Sample	Slope of the Age-Log Real Earnings Profile over Age Range (in years) 16–20	20–25	25–30	30–35
1Y	.1482 (.0044)	.0841 (.0033)	.0099 (.0049)	-.0349 (.0219)
2Y	.1075 (.0048)	.0705 (.0030)	.0209 (.0043)	-.0211 (.0196)
3Y	.0799 (.0071)	.0903 (.0029)	.0261 (.0038)	-.0170 (.1080)
1Q	.1752 (.0043)	.0203 (.0032)	-.0054 (.0046)	-.0330 (.0219)
2Q	.1085 (.0046)	.0408 (.0028)	-.0052 (.0040)	-.0255 (.0191)
3Q	.0790 (.0072)	.0714 (.0028)	-.0014 (.0037)	-.0255 (.0180)

Real Earnings Level at Break Points (in 1967 dollars)
(in natural logs)

Sample	Age Level (in years) 20	25	30	35
1Y	6.9556	7.3761	7.4256	7.2511
2Y	7.3901	7.7426	7.8471	7.7416
3Y	7.7511	8.2026	8.3331	8.2481
1Q	7.2132	7.3147	7.2877	7.1227
2Q	7.4160	7.6200	7.5940	7.4665
3Q	7.7396	8.0966	8.0896	7.9756

Y, Q = years and quarters of experience, respectively.

Figure 2. Age-Log Real Earnings

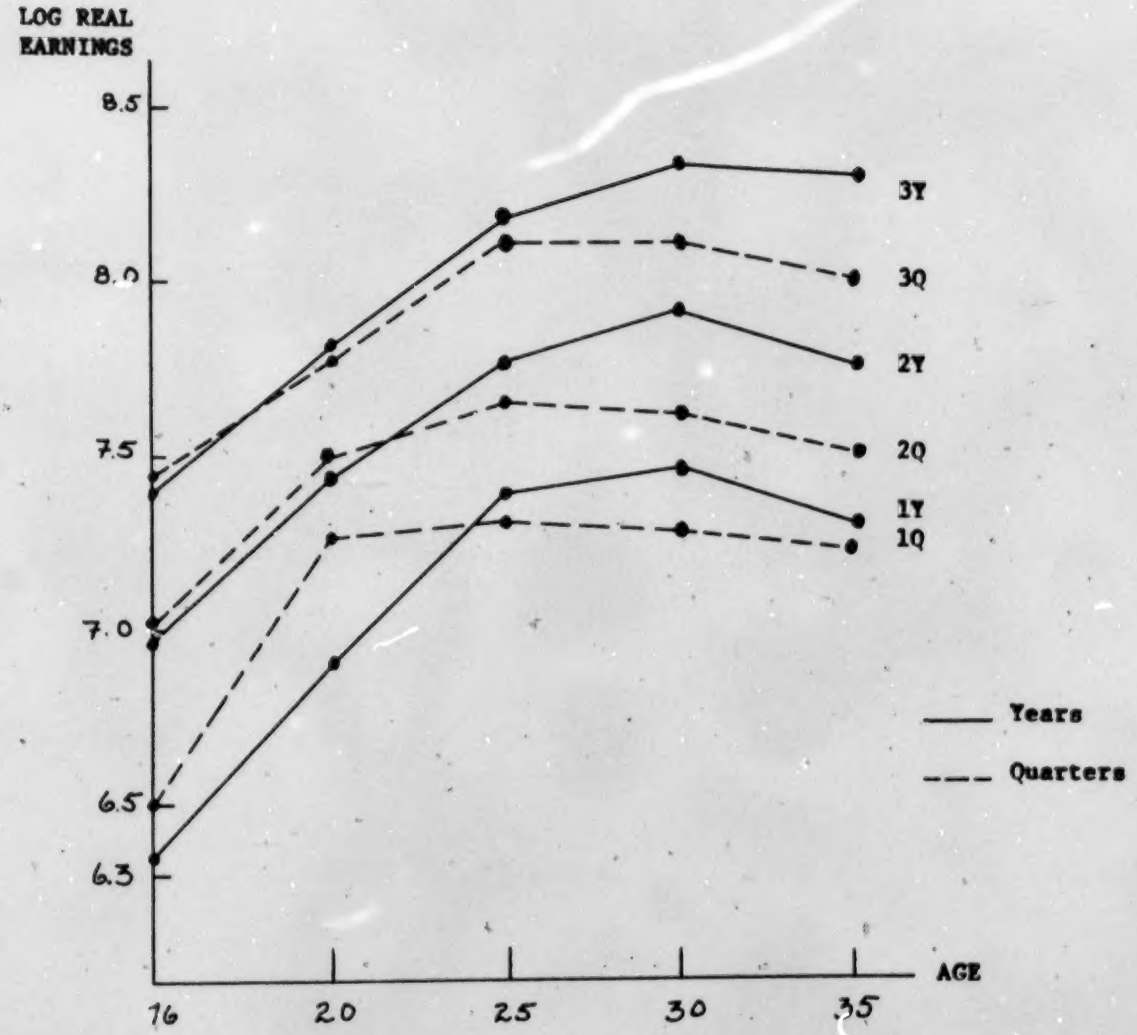

Table 3

The Average Contribution of Age and Experience to Earnings Growth
(measured from age 16 and zero accumulated experience)

Year of Age	Contribution	1Q	2Q	3Q	1Y	2Y	3Y	2Q with Education Proxy
18	Age	17.5%	10.8%	7.9%	14.8%	10.8%	8.0%	.9%
	Experience	4.5	3.2	-.4	30.4	6.8	-.9	3.6
22	Age	72.1	47.5	38.7	67.7	50.0	41.0	10.9
	Experience	56.3	34.8	2.9	67.8	32.2	-1.0	42.2
28	Age	79.2	62.8	67.0	103.3	82.4	82.3	7.6
	Experience	113.3	83.8	32.3	103.7	64.5	13.7	113.4

Source: Table 1 and Table 2 estimates and experience distribution data for each sample. Column Seven uses experience and age parameters described in Section 4, Table 7, equation (2).

Y, Q = Years and quarters of experience, respectively.

samples. In the 1Y sample, experience contributes more, on average, to earnings growth at all stages of young men's labor market experience. This finding is surprising, since age is proxying in specification (2) for educational attainment and other labor supply characteristics not measured in the CWHS. Column seven of Table 3 provides a comparison of age and experience effects on earnings when a proxy for educational attainment, age at Entry 2, is included in the estimation of equation (2) with the 2Q sample. There, as expected, the contribution of experience to earnings growth consistently outstrips that of aging.

Table 4, which reports other regression statistics, shows that initiating work experience measurement at an earlier age and/or using a QUARTERS criterion for measuring experience reduces the unexplained racial

Table 4

Other Statistics for Equation (7)

Sample	1Y	2Y	3Y	1Q	2Q	3Q
Secular Trends	.0155 (.0010)	.0156 (.0098)	.0203 (.0012)	.0171 (.0010)	.0163 (.0010)	.0205 (.0012)
Race Effects	-.1992 (.0096)	-.1913 (.0096)	-.2260 (.0105)	-.1605 (.0104)	-.1743 (.0097)	-.2120 (.0107)
σ_y	.6488	.4972	.3632	.6646	.5136	.3746
σ_ε	.1406	.1377	.1414	.1419	.1313	.1403
$\bar{y}$	7.858	8.045	8.297	7.858	8.045	8.296
R^{2*}	.9523	.9237	.8492	.9547	.9350	.8606
df	2062	2038	1809	1796	1787	1716

***Based on the weighted sum of squared residuals and weighted variance.**

Y, Q = Years and quarters of experience, respectively.

effect in annual earnings. Note finally that the percentage of earnings variation accounted for by age, experience, race, and trend variables increases, the lower the age at which experience is first measured, even though earnings variation is greater in the samples based on Entry 1 than in those based on Entry 2 and Entry 3. This is an interesting result; apparently, measurement of initial experiences in the labor market can enhance our ability to explain earnings variation among young men.

This section has established that the parameter estimates of an earnings function are sensitive to the way experience is measured. Both lowering the age at which experience is first measured and shortening the time interval within which experience accumulates result in a steeper experience-log real earnings profile and a more concave age-log real earnings profile. Differences in the parameters of the age-log real earnings and experience-log real earnings profiles from one sample to the

next are highly significant; F-statistics testing the null hypothesis that earnings function parameters do not depend upon the starting date for measuring work experience exceed 269 (with 1% critical value of 1.83) and those testing experience measures range from 16 for Entry 3 samples to 248 for Entry 1 samples (with 1% critical value of 1.79).[6] These test statistics highlight the arbitrary element in the conventional use of years since school graduation as an experience measure.

4. IMPLICATIONS

The sensitivity of experience- and age-log real earnings profiles to the measure of experience has a number of implications for interpreting earnings function estimates based on the conventional proxy, years since school graduation. First, on a priori grounds, measurement error in the experience variable is expected to bias the coefficient on experience downwards. Differences in experience effects on earnings using the QUARTERS and YEARS measures verify that the inability of experience proxy (1) to differentiate among accumulation of experience by individuals does indeed bias the experience coefficient downwards.

Returns to schooling will be biased upwards to the extent that schooling and unmeasured work experience are positively correlated and pregraduation work experience has an effect on postgraduation earnings. Although CWHS does not provide school graduation information, the proximity of Entry 2 starting ages to school graduation ages permits alternative tests of this hypothesis.[7]

To test the hypothesis that the return to schooling is biased upwards due to unmeasured work experience variables measuring the quarters an individual

worked prior to meeting Entry 2 criteria are introduced. In this test, coefficients on Entry 2 starting ages measure the return to delayed entry which was, presumably, prompted by school enrollment. The test examines how coefficients on starting age, a proxy for schooling, change in the presence of variables measuring work experience accumulated prior to Entry 2.

A number of comments are in order before reporting the results. First, entry age and pre-entry experience accumulation are likely to be correlated with earnings influences not measured in the CWHS (e.g., motivation, intelligence, family background). Therefore, consistent estimates of the effect of entry age and pre-entry work experience require purging these variables of their correlation with the random term in the earnings equation (see Heckman, 1978). A simple procedure for attaining consistent estimates is available: First, earnings function (2) is replaced by

$$y^{r}_{exp,a,t} = f(\text{age, experience, race, secular trend}) + \gamma \underline{z} + \varepsilon^{r}_{exp,a,t} \qquad (3)$$

where $\underline{z}$ represents entry age and pre-entry experience and $E(Z'\varepsilon) \neq 0$ due to selection bias; then, $\underline{z}$ is replaced by $E(\underline{z}/X)$, where $E(\varepsilon, E(\underline{z}/X)) = 0$. By restricting the sample to individuals who enter by age 24,[8] $E(\underline{z}/X)$ is easily obtained from the frequency distribution of entry ages and pre-entry work experience in cohort, race, and age categories. Table 5 reports regression coefficients for equation (2') when $\underline{z}$ includes only entry-age variables, and when $\underline{z}$ includes both entry ages and pre-entry work experience variables.[9] Uncorrected estimates are also reported owing to problems in the selection bias correction.[10]

Table 5

Testing the Significance of Pre-entry 2
Experience Accumulation

(1) $\ln_y$ = f(age, accumulated work experience, race, secular trend)

(2) $\ln_y$ = f(age, accumulated work experience, race, secular trend, age at Entry 2)

(3) $\ln_y$ = f(age, accumulated work experience, race, secular trend, age at Entry 2, pre-Entry 2 accumulated work experience)

(4) Equation (2) without correction for selection bias.

(5) Equation (3) without correction for selection bias.

SAMPLE: Members of 1941-1949 cohorts who meet Entry 2 criteria by age 24.

Coefficient	(1)	(2)	(3)	(4)	(5)
Slope of the age-log real earnings profile over ranges:					
1. 16-18	.1826	.0094	-.0324	.0769	.0075
	(.0095)	(.0178)	(.0185)	(.0092)	(.0091)
2. 18-20	.0746	.0381	.0094	.0026	-.0012
	(.0043)	(.0053)	(.0066)	(.0042)	(.0042)
3. 20-24	.0168	.0140	.0122	-.0611	-.0637
	(.0019)	(.0032)	(.0037)	(.0021)	(.0021)
4. 24-28	-.0249	-.0251	-.0269	-.0821	-.0841
	(.0020)	(.0020)	(.0021)	(.0020)	(.0020)
5. 28-32	-.0540	-.0494	-.0456	-.1050	-.1070
	(.0038)	(.0038)	(.0039)	(.0036)	(.0036)
Age at Entry 2					
18-20 years old		.3880	.3832	.2290	.2200
		(.0338)	(.0340)	(.0045)	(.0045)
21-24 years old		.4217	.2804	.6466	.6118
		(.0579)	(.0652)	(.0079)	(.0080)
Pre-entry experience accumulation					
one quarter			.3077		.0092
			(.0436)		(.0035)
two or more quarters			.7380		.1124
			(.1072)		(.0052)
R^2	.8011	.8017	.8020	.8262	.8279
s.e.	.3794	.3789	.3786	.3571	.3555

Other coefficients reported in note 9.

The entry-age variables in equation 2 are significant (F-statistic of 71.4 [2,6804]) with 5% and 1% critical values of 3.00 and 4.61 respectively). Inclusion of an entry level skills proxy reduces the significance of age in the earnings function and reduces the steepness of the age-log real earnings profile over young ages; however, age remains significant and strictly concave in the presence of a schooling proxy. The significance of age effects is not surprising due to the correlation of age with variables not measured in the CWHS such as attachment to the labor force and nonlabor income, and due to measurement error in the schooling proxy, age at Entry 2. The decline in the age profile at age 2Y is surprising, since one would not expect physical deterioration to be a factor at such a young age. The decline may be a result of the triangular nature of the data (i.e., fewer cohorts are represented at older ages than at younger ages), a characteristic of all cohort analyses, and one which introduces biases into the estimates of age- (and experience-) log real earnings profiles similar to those present in a cross-sectional analysis (see, for example, Ruggles and Ruggles, 1977). It may also result from the possibility that, at the same experience and schooling level, older individuals may have spent more time not developing skills or employer attachments and may, ceteris paribus, have lower earnings (Lazear, 1973).

Pre-entry experience variables included in regression (3) are also significant (F-statistic of 34.2 [2,6807]) and positive. As hypothesized, the coefficients on age at Entry 2 drop when pre-entry experience is accounted for. The significance of the early experience variables, coupled with the significance of experience vis-à-vis age in the earnings function, has serious implications for the longer-run effects on unemployment;

according to regression (3), loss of work experience at a young age has a significant effect on the subsequent earnings of young men. This finding supports that of Wise and Meyer (1979) and Ellwood (1979) who also find that work experience affects subsequent earnings of young men.

5. SUMMARY

A measure of general work experience involves arbitrary elements: (a) a starting date for measuring when work experience begins to be accumulated; and (b) a rule for valuing any experience accumulated. The conventional experience proxy based on age less years of schooling establishes graduation as a starting point and numbers of years since graduation as the measure of accumulated work experience. This proxy leads to potentially severe econometric biases because age and experience effects are not separated and the experience proxy measures experience with error.

In this paper experience variables were constructed under alternative starting dates and criteria for measuring accumulated work experience. Use of experience variables, constructed from Continuous Work History Sample data, in a modified human capital earnings function established that the parameters of the age-log real earnings and experience-log real earnings profiles and the return to schooling are sensitive to the alternative measures of general work experience. Refinement of the experience measure enhances our ability to explain the earnings of very young men and verifies that among young men (16 to 32), initial employment experiences have a significant long-run effect on earnings. Work experience measures which ignore experience accumulated before leaving school ignore a potentially significant influence on human capital development; in particular, such measures attribute too much human capital development to schooling.

NOTES

[1]Establishing an earnings minimum for attaining work experience at a fairly low level is desirable in so far as it leads to the exclusion of extremely casual employment experiences. Because of nominal and real inflation over the sample period, however, I adjusted the Social Security earnings cutoff of $50 so that it increases in value by the percentage change in average hourly earnings, i.e., from $50 in 1937 to $186 in 1957 to $388 in 1973. Estimates reported here only include nonfarm wages and salary earnings. Farm earnings and self-employment income are excluded from the earnings tabulations.

[2]Before 1957, social security earnings coverage was inadequate; thus I initiated the sample period in 1957 and included only the 1941-1957 cohorts in order to insure reliability of the experience measures.

[3]Individuals whose earnings fall short of one quarter of work experience in a given year are excluded from the tabulations for that year since preliminary analysis indicated that correcting for their exclusion in a given year does not alter the results reported here. Each entry date implies that the earnings model explains earnings from the entry data onwards and, therefore, no attempt is made to correct the Entry 2 (3) estimations for the exclusion of individuals who have not yet met the entry criteria. To reduce computational costs, observations of individuals in age-cohort-race-experience categories were aggregated; aggregation bias is absent since the regressors are identical for all individuals in the aggregation unit.

[4] F-statistics of hypotheses testing the significance of age and experience variables.

Starting Date	Experience measure	F-statistic for H_0: given age, race, and secular trends, experience has no effect on y	F-statistic for H_0: given experience, race, and secular trends, age has no effect on y
ENTRY I	YEARS	637.82 (4,2062)	562.60 (4,2062)
	QUARTERS	1204.22 (4,1796)	488.31 (4,1796)
ENTRY II	YEARS	396.97 (4,2038)	400.40 (4,2038)
	QUARTERS	859.55 (4,1787)	257.26 (4,1787)
ENTRY III	YEARS	60.18 (4,1809)	426.56 (4,1809)
	QUARTERS	249.96 (4,1716)	261.31 (4,1716)

[5] The contribution of experience to earnings growth from age 16 to the start of the Ath year of age is measured for a specific sample by

$$\sum_{i=1}^{A-15} w_A^1(i)\beta_i,$$

where $w_A(i)$ is the percentage of the sample with experience level i at the start of the Ath year and β_i is the effect of experience level i on earnings (from Table 1).

[6] Hypothesis tests of the equivalence of the parameters from different samples:

Hypothesis	Samples	F-statistics	5% (1%) critical values
Earnings function parameters do not depend upon the experience measure	1Y and 1Q	248.31 (11,3858)	1.79 (2.25)
	2Y and 2Q	60.69 (11,3825)	1.79 (2.25)
	3Y and 3Q	16.04 (11,3875)	1.79 (2.25)
Earnings function parameters do not depend upon the starting date for measuring work experience	1Y, 2Y, and 3Y	357.56 (22,5909)	1.54 (1.83)
	1Q, 2Q, and 3Q	261.14 (22,5299)	1.54 (1.83)

[7]Rough comparisons of entry age distributions with educational attainment data indicate that school graduation ages rest, in general, between the Entry 2 and Entry 3 entry ages, as seen in the following chart.

Starting Date	CWHS Samples: % of Cohort Grouping Entering the Sample by Age[a]			
	16	18	21	25
ENTRY I				
1941–1944	28.91	74.06	93.55	96.40
1945–1948	24.37	74.60	91.80	96.71
1949–1952	34.35	78.35	89.63	
1953–1957	41.04	78.00	—	
ENTRY II				
1941–1944	50.1	38.48	81.13	88.42
1945–1948	3.27	38.36	81.12	92.20
1949–1952	5.32	42.43	76.69	—
1953–1956	7.19	44.10	—	—

Probable Age	Conventional Experience Measures[b]: At most 12 years (< = 18)	Some or all of college (19–22)	Advanced studies (23+)
1940–1944	65.7	25.6	8.6
1945–1949	59.9	33.1	7.0
1950–1952	57.5	39.4	na
1953–1954	60.2	39.6	na

[a]Source: CWHS tabulations and U.S. Bureau of the Census.

[b]P-20 Series, March, 1974. Note that the ages provided under the alternative school levels are "probable," not exact, ages due to breaks in educational attainment.

[8]Less than complete coverage of earnings and the potential presence of individuals holding multiple Social Security numbers cause individual earnings histories which begin after age 24 to be suspect. Since the data end in 1973, the CWHS provides representative samples of the 1941 to 1949 cohort members who meet ENTRY 2 criteria by age 24.

[9]Other regression statistics for regressions reported in Table 5 are:

Slope of the experience-log real earnings profile over ranges:	(1)	(2)	(3)	(4)	(5)
0-2	.2049	.0261	.2058	.3165	.3208
	(.0032)	(.0032)	(.0032)	(.0033)	(.0033)
2-6	.1672	.1673	.1675	.2343	.2372
	(.0018	(.0018)	(.0018)	(.0019)	(.0019)
6-11	.0971	.0979	.0975	.1542	.1563
	(.0024)	(.0024)	(.0024)	(.0084)	(.0023)
11-17	.0645	.0647	.0649	.1222	.1245
	(.0088)	(.0088)	(.0088)	(.0084)	(.0083)
Nonwhite race differential	-.2298	-.2622	-.2393	-.2383	-.2316
	(.0052)	(.0065)	(.0071)	(.0049)	(.0049)
Time Trend (1957 = .1)	.0447	.0330	.0167	.0571	.0544
	(.0072)	(.0079)	(.0081)	(.0007)	(.0068)
Constant Term*	6.9144	7.0368	7.0102	6.9720	6.9700
	(.0171)	(.0204)	(.0211)	(.0162)	(.0161)

*

Regression	Normalization
(1)	age 16, experience 0
(2),(4)	age 16, experience 0, entry age 16-17
(3),(5)	age 16, experience 0, entry age 16-17, no experience prior to Entry 2.

[10]The correction removes any intracohort variation in entry age and pre-entry work experience from the variables. Secular increases in entry age and pre-entry experience cause the corrected variable to be highly correlated with trend and age variables, leading to a large overstatement of entry age and pre-entry experience effects on earnings.

REFERENCES

Corcorran, M., and Duncan, G. 1979. Work history, labor force attachment, and earnings differences between races and sexes. Journal of Human Resources, 14, 3-20.

Ellwood, D. 1979. Teenage unemployment: Permanent scar or temporary blemish? To be published in the Proceedings of the National Bureau of Economic Research Conference on Youth Unemployment, edited by R. Freeman and D. Wise, Cambridge, Mass.

Griliches, Z. 1977. Estimating the returns to schooling: Some econometric problems. Econometrica, 45, 1-22.

Hanushek, E., and Quigley, J. 1978a. Implicit investment profiles and intertemporal adjustments of relative wages. American Economic Review, 68, 67-79.

_____. 1978b. More exacting tests of the OJT investment model. Yale University, mimeographed.

Hauser, R. 1979. Earnings trajectories of young men. University of Wisconsin-Madison, mimeographed.

Heckman, J. 1978. Statistical models for discrete longitudinal data. University of Chicago, Center for Mathematical Studies in Business and Economics.

Lazear, E. 1976. Age, experience, and wage growth. American Economic Review, 66, 548-558.

Medoff, J., and Abraham, K. 1978. Experience, performance, and earnings. NBER Working Paper #278, March.

Mincer, J., Schooling, age and earnings, NBER, 1974.

Quigley, J., and Klevmarken, A. 1976. Age, experience, earnings, and investments in human capital. Journal of Political Economy, 84, 47-72.

Ruggles, R., and Ruggles, N. 1977. The anatomy of earnings behavior. In F. Thomas Juster (ed.), The distribution of economic well-being. Cambridge, Mass.: Ballinger.

Smith, J., and Welch, F. 1977. The new depression in higher education: Ulcers or indigestion? Mimeographed.

Wise, D., and Meyer, R. 1979. High school preparation and early labor market experience. To be published in the Proceedings of the National Bureau of Economic Research Conference on Youth Unemployment, edited by R. Freeman and D. Wise, Cambridge, Mass.